Name of Organization: USACE- Buffalo District

Type of Organization: Federal Agency

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Project Title: Little Beaver Is. Wetland Restoration: Ecological Modeling

Project Category: Habitat (Ecological) Protection and Rest

Rank by Organization (if applicable): 0

Total Funding Requested ($): 143,350 **Project Duration:** 1 Years

Abstract:

Little Beaver Island Wetland is part of Beaver Island State Park situated at the southwestern tip of Grand Island, New York. Little Beaver Island borders the Chippewa Channel of the upper Niagara River and historically sheltered an extensive (10± acre) permanent, connecting channel coastal marsh in a shallow embayment between the island's interior and the Grand Island mainland. In 1969 the New York State Office of Parks Recreation and Historic Preservation carried out a capital improvement project that resulted in the filling of the Little Beaver Island Wetland and the reconfiguration of Beaver Creek, an existing side channel to the Niagara River. The Little Beaver Island Wetland is a complex coastal system. Restoration of this wetland requires a complete understanding of the existing and the historic biological and physical site conditions. Through a partnership with GLNPO, wetlands experts with the U.S. Army Corps of Engineers would use existing and emerging technology to develop a computer-based ecological modeling tool. The ecological model will be used to develop design alternatives for Little Beaver Island Wetland that would restore and enhance the historic wetland conditions. The model will also form the template for the development of similar new technologies with applications for ecological restoration throughout the Great Lakes basin.

Geographic Areas Affected by the Project

States:

- ☐ Illinois
- ☒ New York
- ☐ Indiana
- ☐ Pennsylvania
- ☐ Michigan
- ☐ Wisconsin
- ☐ Minnesota
- ☐ Ohio

Lakes:

- ☐ Superior
- ☒ Erie
- ☐ Huron
- ☒ Ontario
- ☐ Michigan
- ☐ All Lakes

Geographic Initiatives:

☐ Greater Chicago ☐ NE Ohio ☐ NW Indiana ☐ SE Michigan ☐ Lake St. Clair

Primary Affected Area of Concern: Niagara River, NY

Other Affected Areas of Concern:

For Habitat Projects Only:

Primary Affected Biodiversity Investment Area: Not Applicable

Other Affected Biodiversity Investment Areas:

Problem Statement:

The loss of fish & wildlife habitat throughout the Niagara River Area of Concern (AOC), has been dramatic and was designated as a beneficial use impairment by the Niagara River RAP and by the Four Parties in the Lake Ontario basin Stage I Lakewide Management Plan (LaMP). The Four Parties of the LaMP agree that the loss of fish and wildlife habitat impairment is caused by several factors including the physical loss, modification, and destruction of habitat. Wetlands adjacent to the Niagara River are an integral part of the Niagara River ecosystem providing spawning and nursery areas for certain fish species and feeding, breeding, rearing and resting areas for many birds, semi-aquatic mammals, reptiles and amphibians. The Niagara River Corridor, stretching from Lake Ontario to Lake Erie encompassing portions of the State of New York and the Province of Ontario is a designated Global Level Important Bird Area and supports one of the world's largest concentrations of birds, including as many as 100,000 gulls of up to 10 species, tens of thousands of waterfowl up to 34 species, and an incredible diversity of neotropical migratory songbirds.

Human activities have significantly reduced and diminished the quantity and quality of coastal wetland habitats in the Niagara River Corridor for avifauna and for fish, reptile and amphibian species endemic to the region. Available information suggests that degradation of fish & wildlife populations in the Niagara River AOC are, in part, due to habitat alterations and the destruction of river, marsh and tributary habitats. The physical alteration of the Little Beaver Island Wetland is an example of the degradation of these habitats and the loss of unique emergent and submerged connecting channel coastal marsh and associated fish and wildlife habitats in the upper Niagara River AOC. Restoring and maintaining an improved quality of life in the ecosystem of the Niagara River and its watershed and restoration of fish and wildlife communities and habitats are among the goals of the Niagara River RAP and part of the five priority objectives for the Lake Ontario basin set forth in the Stage I LaMP.

Proposed Work Outcome:

To restore and enhance historical wetland conditions to 10 acres of coastal marsh wetland in the upper Niagara River, a computer-based wetland modeling tool would be developed and used to explore and evaluate wetland restoration design alternatives for Little Beaver Island Wetland. The ecological model would be developed using the traditional methods of literature review, archival searches for old photographs and land maps and field data obtained from the Little Beaver Island Wetland restoration site and from reference wetland sites selected using remote sensing/GIS technology. The model would allow for the selection of specific restoration design features that would predict and present corresponding ecological responses. This would facilitate the selection of design alternatives that would most similarly replace the historical wetland conditions at Little Beaver Island Wetland.

Digital databases would be constructed within GIS and searched to locate similar coastal marsh wetland reference sites in

the Niagara River and parts of Lakes Erie and Ontario and the St. Lawrence Seaway. The search image would be based on the historic and present physical and biological characteristics of the Little Beaver Island Wetland. Once reference sites are identified with the GIS database, the most suitable reference sites would be selected, visited and sampled for a variety of features.

The restoration and reference sites would be analyzed for correlations by comparison of data by using both descriptive and multivariant statistics. Before correlations would be developed the existing physical and biological site conditions at the restoration site and the reference sites would be examined and recorded. The baseline analysis of the restoration site would include an accurate topographic ground survey, a partial bathymetric analysis of Beaver Creek adjacent to the restoration area, the location of existing wetland boundaries, plant community structural and species inventory and mapping, wildlife usage and habitat analysis, an evaluation of the wetland hydrologic inflow and outflow components, and soil borings and profile descriptions in the fill areas including textural analysis and depth of fill to native soils to enable the reconstruction of the previous extent of hydric soils. The reference wetland sites would be sampled for physical and biological parameters that are similar to those collected at the Little Beaver Island Wetland restoration site and that best characterize the reference sites. The results from these data would assist in establishing the extent of the historical wetland and some of the site dynamics that would be used in the analysis.

By using the environmental variable data collected at both the reference sites and the restoration area, a series of community profile models would be built. These profiles would generally be designed to predict ecological responses by aquatic species to changes in environmental variable data (i.e., topography and hydrology). For instance, the change of channel depth or width will cause a select suite of aquatic plant species to respond and likewise repress other types of species. By developing pools of species responses to changes in site physical features, a computer matrix model would be developed to visually show results of different design options. By modeling the restoration design, various alternative designs will be evaluated to determine which design would be most similar to the historical conditions.

To evaluate the possible impacts from invasive species, the model would be front loaded with a series of questions and choices that would expose possible design flaws. For instance, the coastal marsh back channel area would be computer designed with certain criteria that will show various design flaws that provide for invasive of noxious species based on certain types of perturbations. These invasive species pool models would help eliminate costly design mistakes to habitat integrity.

A written report would provide the method and results for determining the historical conditions of the Little Beaver Island Wetland. The computer-based model in ArcView would be available on CD disk for resource managers to plan wetland construction activities at Little Beaver Island Wetland. This software would be custom scripted for analysis and display purposes. The final report would also include several hard copy maps showing restoration design alternatives that would result in reconstruction of historical wetland conditions.

Project Milestones:	Dates:
Project Start/Publicize Project	10/2000
Literature & Historical Data Review	12/2000
Wetland Reference Site Location	01/2001
Reference and Restoration Site Sampling	02/2001
Develop Wetland Modeling Tool	06/2001
Develop Design Alternatives	07/2001
Reports and Software	09/2001
Project End	10/2001

☒ Project Addresses Environmental Justice

If So, Description of How:

When combined with proposed and ongoing initiatives, the future wetland restoration project would further establish Beaver Island State Park as an environmental education destination for the western New York Region and the inner cities of Buffalo and Niagara Falls. Presently, Buffalo inner city School districts have very limited access to environmental education opportunities. This project would become an environmental showcase for natural resource restoration that would focus on society's history of environmental impact and the possibilities of natural resources restoration technology to reverse these impacts.

☒ Project Addresses Education/Outreach

If So, Description of How:

The project supports the planning and completion of the overall Little Beaver Island Wetland restoration project, which will significantly advance the scope, and extent of the environmental educational opportunities that already exist within Beaver Island Park. Through published announcements and community outreach this project would become an environmental showcase for natural resource restoration that would demonstrate the possibilities of restoration technology to reverse past resource impacts and restore environmental functions and benefits.

Currently, the park supports two interpretive nature trails one on Little Beaver Island that could be merged into the planned wetland restoration project and a second trail system on the east side of the park that will link with a planned environmental education center. The latter project will be carried out as a joint partnership between the Audubon Society and the New York State Office of Parks. When combined with these ongoing initiatives the proposed wetland restoration project will help establish Beaver Island State Park as an environmental education destination for the western New York Region and the inner cities of Buffalo and Niagara Falls.

Project Budget:

	Federal Share Requested ($)	Applicant's Share ($)
Personnel:	68,000	0
Fringe:	60,000	0
Travel:	3,700	0
Equipment:	2,100	0
Supplies:	2,750	0
Contracts:	1,400	0
Construction:	0	0
Other:	0	0
Total Direct Costs:	137,950	0
Indirect Costs:	5,400	0
Total:	143,350	0
Projected Income:	0	0

Funding by Other Organizations (Names, Amounts, Description of Commitments):

The New York State Department of Transportation has expressed an interest in funding the Little Beaver Island Wetland restoration project and has included the project in their NYSDOT-Region 5 Environmental Initiatives listing for Erie County, New York.

Description of Collaboration/Community Based Support:

The New York State Office of Parks Recreation and Historic Preservation has provided the Buffalo District with a letter supporting the Little Beaver Island Wetland restoration project and the Town of Grand Island has publicly endorsed the project. The New York State Department of Transportation has included the project on its list of Environmental Initiatives for Erie County, New York and is a potential source of restoration project funding. The project has also been discussed in conceptual terms with a number of environmental groups and organizations and verbal endorsements have been provided by the Buffalo Chapter of the Audubon Society, Sierra Club, Grand Island Quality Quest Coalition, Great Lakes United, Citizens for a Green Tonawanda, the New York State Department of Environmental Conservation, and the Niagara Musky Association.